Clean copy of the allowed claims

1. A method for identifying potential noise failures in an integrated circuit design comprising:

locating a victim net and an aggressor within the integrated circuit design;

modeling the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determining a coupling between the victim net and the aggressor;

determining noise width using the model of the victim;

determining peak noise amplitude using the model of the victim net; and

indicating that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

2. (Deleted).

3. (Deleted).

4. The method defined in Claim 6 wherein the noise width is determined corresponding to:

$$t_v \ln[(t_x - t_r v_t)(e^{t_r/t_v} - 1)/ t_r v_t]$$

where t_r comprises transition time, t_v comprises distributed Elmore delay of the victim net, t_x comprises the RC delay term from the upstream resistance of the coupling elements multiplied by the coupling capacitance, and v_t comprises a threshold voltage.

5. The method defined in Claim 4 wherein the threshold voltage is set to half of the peak noise voltage.

6. A method for identifying potential noise failures in an integrated circuit design comprising:

locating a victim net and an aggressor within the integrated circuit design;

modeling the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determining a coupling between the victim net and the aggressor;

determining noise width, wherein the noise width is determined corresponding to:

$t_r + t_v \ln[(1- e^{-2t_r/t_v})/ (1- e^{-t_r/t_v})]$

where t_r comprises transition time and t_v comprises a distributed Elmore delay of the victim net;

determining peak noise amplitude using the model of the victim net; and

indicating that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

7. A method for identifying potential noise failures in an integrated circuit design comprising:

locating a victim net and an aggressor within the integrated circuit design;

modeling the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determining a coupling between the victim net and the aggressor;

determining noise width, wherein the noise width is based on only transition time and distributed Elmore delay of the victim net;

determining peak noise amplitude using the model of the victim net; and

indicating that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

8. A method for identifying potential noise failures in an integrated circuit design comprising:

locating a victim net and an aggressor within the integrated circuit design;

modeling the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determining a coupling between the victim net and the aggressor;

determining noise width, wherein the noise width is independent of an RC delay term from upstream resistance of the coupling element times coupling capacitance of the coupling location;

determining peak noise amplitude using the model of the victim net; and

indicating that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

9. (Deleted)

10. The method defined in Claim 9 wherein the peak noise amplitude is determined according to:

$$(R_d + R_s)\, C_x \,/\, \{ R_d (C_1 + C_x + C_2 + C_L) + R_s (C_x + C_2 + C_L) + R_e C_L \}$$

where R_d comprises the effective resistance of the victim driver, R_s comprises the upstream wire resistance from the victim driver to the coupling center, R_e is the downstream wire resistance from the coupling center to the receiver under noise consideration, C_x is the coupling capacitance, C_1 is half of the upstream wiring capacitance from the coupling center to the driver, C_2 is half of the total wire capacitance on the path from the driver to the receiver, and C_L is half of the total wire capacitance from the coupling center to the receiver, plus the receiver input capacitance.

11. The method defined in Claim 1 wherein modeling the victim net comprises computing crosstalk noise at a sink with a lumped capacitance at each branch incorporated on a path from a source to the sink, with lumped capacitances being added in a weighted manner based on their locations on the path.

12. An article of manufacture comprising one or more recordable medium having executable instructions stored thereon which, when executed by a system, cause the system to:

locate a victim net and an aggressor within the integrated circuit design;

model the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determine a coupling between the victim net and the aggressor;

determine noise width using the model of the victim;

determine peak noise amplitude using the model of the victim net; and

indicate that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

13. (Deleted).

14. (Deleted).

15. The article of manufacture defined in Claim 17 wherein the noise width is determined corresponding to:

$t_v \ln[(t_x - t_r v_t)(e^{t_r/t_v} - 1)/ t_r v_t]$

where t_r comprises transition time, t_v comprises distributed Elmore delay of the victim net, t_x comprises the RC delay term from the upstream resistance of the coupling elements multiplied by the coupling capacitance, and v_t comprises a threshold voltage.

16. The article of manufacture defined in Claim 15 wherein the threshold voltage is set to half of the peak noise voltage.

17. An article of manufacture comprising one or more recordable medium having executable instructions stored thereon which, when executed by a system, cause the system to:

locate a victim net and an aggressor within the integrated circuit design;

model the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determine a coupling between the victim net and the aggressor;

determine noise width, wherein the noise width is determined corresponding to:

$t_r + t_v \ln[(1 - e^{-2t_r/t_v})/(1 - e^{-t_r/t_v})]$

where t_r comprises transition time and t_v comprises a distributed Elmore delay of the victim net;

determine peak noise amplitude using the model of the victim net; and

indicate that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

18. An article of manufacture comprising one or more recordable medium having executable instructions stored thereon which, when executed by a system, cause the system to:

locate a victim net and an aggressor within the integrated circuit design;

model the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determine a coupling between the victim net and the aggressor;

determine noise width, wherein the noise width is based on only transition time and distributed Elmore delay of the victim net;

determine peak noise amplitude using the model of the victim net; and

indicate that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

19. An article of manufacture comprising one or more recordable medium having executable instructions stored thereon which, when executed by a system, cause the system to:

locate a victim net and an aggressor within the integrated circuit design;

model the victim net using two π-type resistor-capacitor (RC) circuits, wherein modeling the victim net using two π-type resistor-capacitor (RC) circuits comprises modeling the victim net with one π-type RC circuit before a coupling location and one π-type RC circuit after the coupling location;

determine a coupling between the victim net and the aggressor;

determine noise width, wherein the noise width is independent of an RC delay term from upstream resistance of the coupling element times coupling capacitance of the coupling location;

determine peak noise amplitude using the model of the victim net; and

indicate that the integrated circuit design requires modification if the noise width or the peak noise amplitude indicates that a potential noise failure will occur in the integrated circuit design.

20. (deleted).

21. The article of manufacture defined in Claim 20 wherein the peak noise amplitude is determined according to:

$$(R_d + R_s)\, C_x / \{ R_d (C_1 + C_x + C_2 + C_L) + R_s (C_x + C_2 + C_L) + R_e C_L\}$$

where R_d comprises the effective resistance of the victim driver, R_s comprises the upstream wire resistance from the victim driver to the coupling center, R_e is the downstream wire resistance from the coupling center to the receiver under noise consideration, C_x is the coupling capacitance, C_1 is half of the upstream wiring capacitance from the coupling center to the driver, C_2 is half of the total wire capacitance on the path from the driver to the receiver,

and C_L is half of the total wire capacitance from the coupling center to the receiver, plus the receiver input capacitance.

22. The article of manufacture defined in Claim 12 wherein

instructions to model the victim net comprise instructions to compute crosstalk noise at a sink with a lumped capacitance at each branch incorporated on a path from a source to the sink, with lumped capacitances being added in a weighted manner based on their locations on the path.

23. (Deleted).

24. (Deleted).

25. (Deleted).

26. (Deleted).

27. (Deleted).

28. (Deleted).

29. (Deleted).

30. (Deleted).

31. (Deleted).

32. (Deleted).

33. (Deleted).